WHAT IS CLAIMED IS:

1. A method for preparing metallic nanometer scale wires comprising the steps of

electrodepositing a plurality of wires from an aqueous solution including a metal at step edges present on a stepped surface,

embedding the plurality of wires in a polymer film, and

lifting the plurality of wires off of the stepped surface.

2. The method of claim 1 wherein the electrodepositing step includes applying a nucleation pulse to the aqueous solution.

3. The method of claim 2 wherein the electrodepositing step further includes applying a deposition potential to the aqueous solution.

4. The method of claim 3 wherein the over potential corresponding to the deposition potential is less than about - 400 millivolts.

5. A method for preparing metallic nanowires comprising the steps of

electrodepositing metal oxide particles at step edges present on a stepped surface from an aqueous solution including a metal oxide forming a plurality of metal oxide wires,

reducing the plurality of metal oxide wires via gas phase reduction to a plurality of metal wires,

embedding the plurality of metal wires in a polymer film, and

lifting the plurality of metal wires from the stepped surface.

6. The method of claim 5 wherein the electrodepositing step includes applying a deposition potential to the solution.

7. The method of claim 6 wherein the over potential corresponding to the deposition potential is less than –900 millivolts.

8. The method of claim 5 wherein the reducing step includes reducing the plurality of metal oxide wires in hydrogen gas.

9. The method of claim 8 wherein the reducing step further includes reducing the plurality of metal oxide wires at about 500° C.

10. A method for preparing beaded nanowires comprising the steps of

electrodepositing nanoparticles of a first metal from a first aqueous solution at step edges present on a stepped surface, and

electrodepositing wire segments of a second metal from a second aqueous solution at the stepped edges between the nanoparticles forming a plurality of beaded nanowires.

11. The method of claim 10 wherein the first metal is a noble metal.

12. The method of claim 10 further comprising the step of capping the nanoparticles with a ligand.

13. The method of claim 12 further comprising the step of heating the nanoparticles and wire segments of the plurality of beaded nanowires at reduction conditions.

14. The method of claim 13 further comprising the step of embedding the plurality of beaded nanowires in a polymer film.

15. The method of claim 13 further comprising the step of removing the plurality of beaded nanowires from the stepped surface.

16. A method for preparing nanometer scale metallic wires comprising the steps of

applying a deposition potential to an aqueous solution comprising a metal or metal oxide wherein the deposition potential corresponds to an over potential of less than −900 millivolts, and

selectively depositing metal or metal oxide nanowires at step edges present on a stepped surface.

17. The method of claim 16 further comprising the step of reducing the metal oxide nanowires in hydrogen gas.

18. The method of claim 17 wherein the reducing step includes reducing the metal oxide nanowires in hydrogen gas at about 500° C.

19. The method of claim 16 further comprising the step of embedding the metal nanowires in a polymer film and removing the metal nanowires from the stepped surface.

20. A wire comprising a conductive metal and having a diameter that is greater than about 5 nanometers and a length that is greater than about 20 microns.